LPG - Propane

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PROPANE – LEADING ALTERNATIVE FUEL

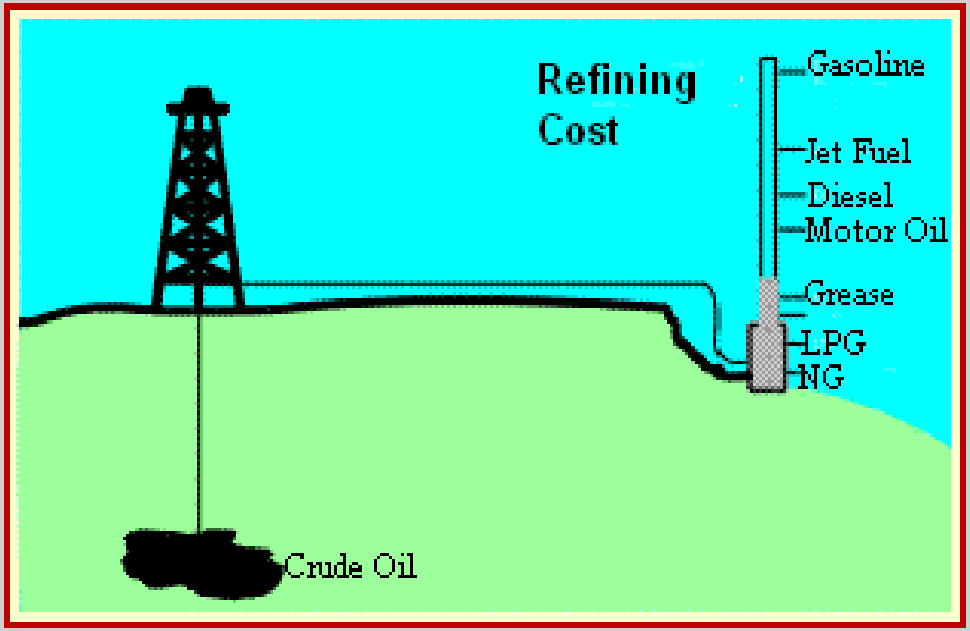
- Propane:
  - Was introduced in the early 1900s
  - Is used in over 350,000 over-the-road vehicles in the US
  - Is used in over 4 Million over-the-road vehicles worldwide
  - Is the leading alternative fuel in the U.S. and the World

WHAT IS PROPANE?

- Hydrocarbon based fuel
- Vapor at standard temperature & pressure
- Composed primarily of Propane with trace amounts of Butane
- Is heavier than air
- Has a boiling point of -44 F

HOW IS PROPANE PRODUCED?

- 45% of US production is a by-product of crude oil refining
- 55% of US production is obtained from Natural Gas processing



Liquified petroleum gas, LPG, is separated from either crude oil or natural gas. Most LPG is derived from domestic sources. Refining costs are lower for LPG than for most other fuels.

WHAT IS LPG?

- LPG is Propane vapor that has been liquefied for storage.
- LPG & Propane are terms that can be used interchangeably.
- LPG has a low boiling point

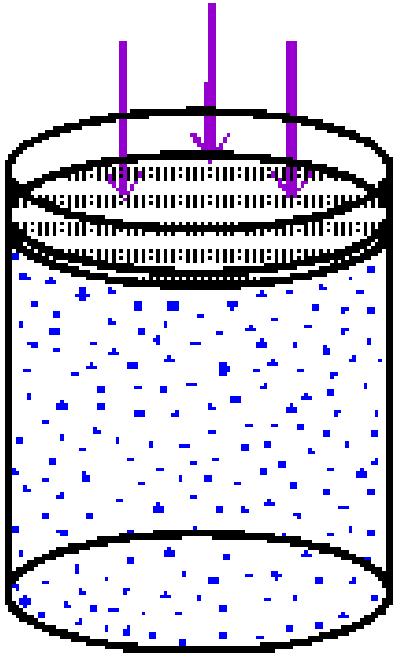
  -Below -44 F, propane exists as a liquid

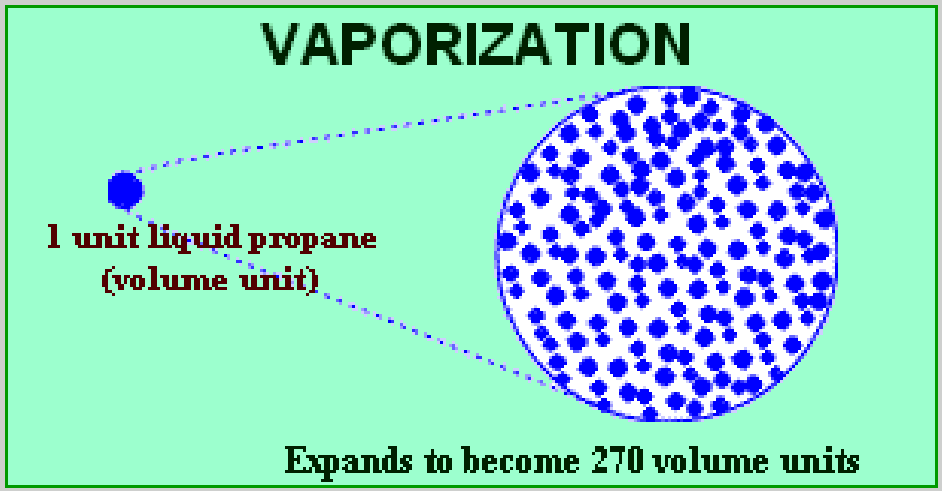
  -Above -44 F, propane will vaporize unless it is held under pressure

HOW IS LPG PRODUCED?

- Through the pressurization of propane vapor
- When pressurized a phase change occurs causing the propane vapor to become a liquid

LIQUEFYING PROPANE

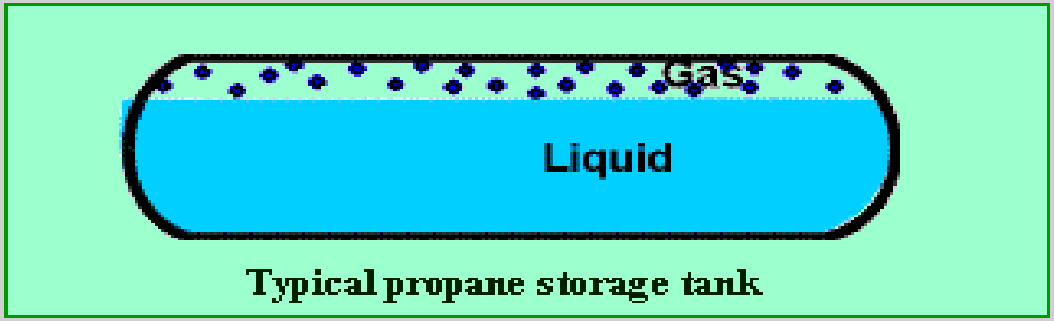




One unit of propane liquid expands 270 times when the pressure is reduced. This is significant because:

- Less storage space is required when propane is stored in its liquid form;
- The expansion ratio eliminates the need for a fuel pump.

PROPAND: LIQUID AND GAS



Typical propane storage tank

Propane stored in tanks is present in both liquid and vapor forms. The two phases will exist in the tank as long as the pressure is maintained. If the pressure is reduced liquid propane will rapidly vaporize to gas.

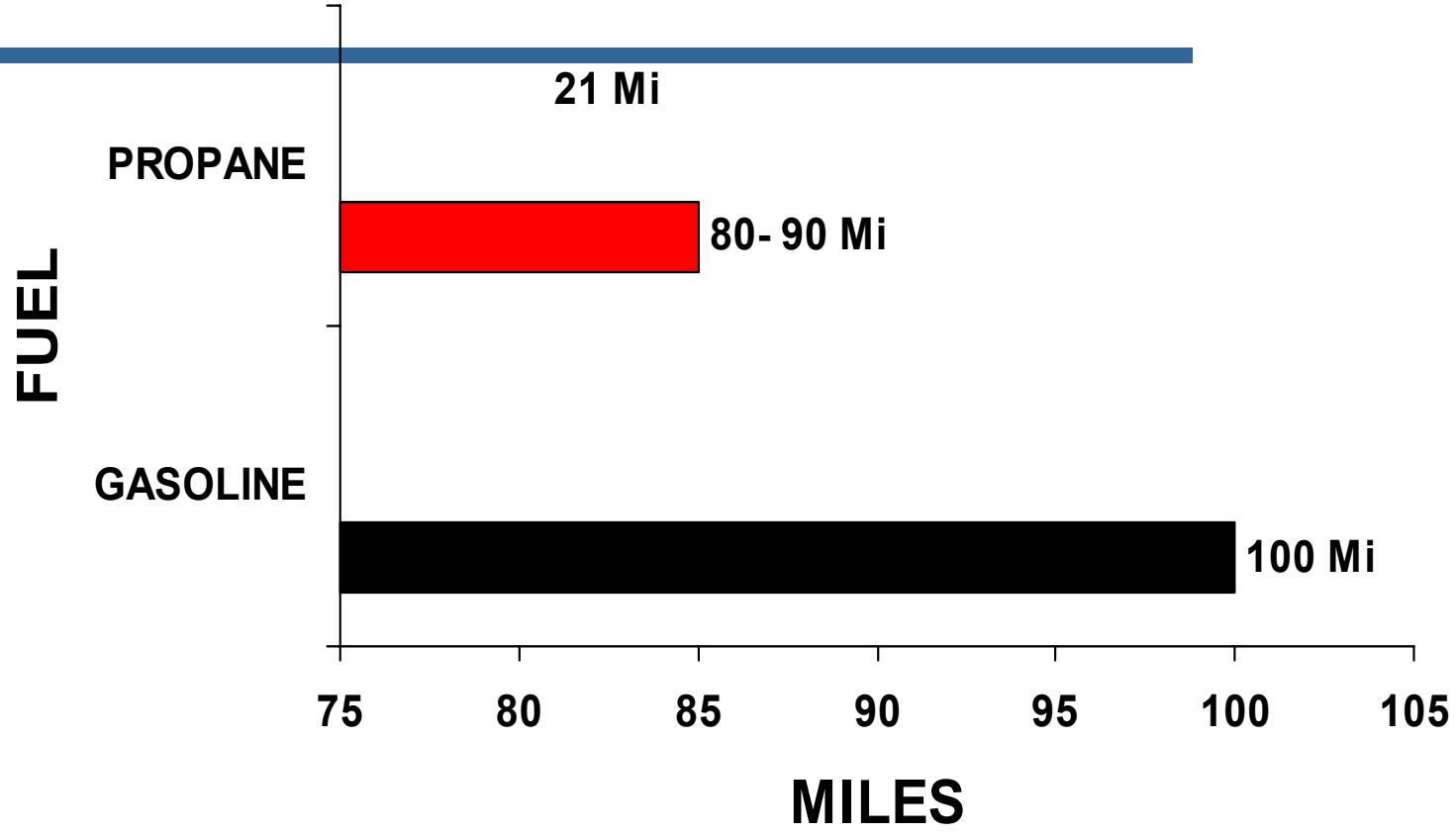
PROPANE – AN ALTERNATIVE FUEL

- Qualifies as an Alternative Fuel under Federal Energy Policy Act
- Qualifies as an Alternative Fuel under the Clean Air Act Amendments
- 95% of the Propane consumed in the US is produced domestically

PROPANE – OCTANE RATING

Fuel	Octane (R + M)/2 =
Regular Unleaded Gasoline	**Octane** 87
Mid-Grade Unleaded Gasoline	89
Premium Unleaded	91-93
Propane (HD-5)	100-105

DRIVING RANGE COMPARISONS

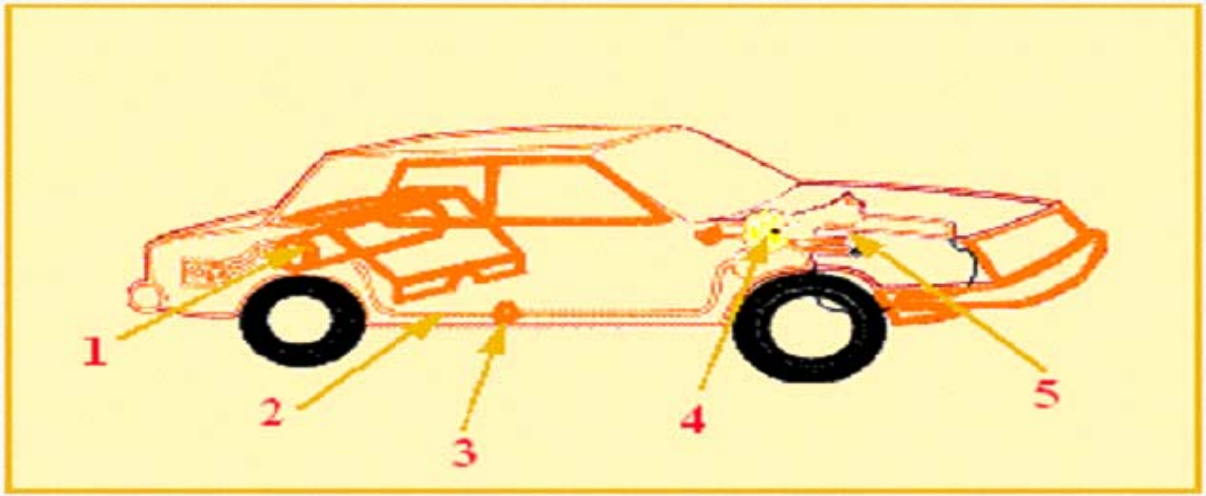


POSITIVE ASPECTS OF USING PROPANE

- Leaves no lead, varnish or carbon deposits
- Reduces friction and wear on cylinders, pistons and rings
- Is self-pressurized so no fuel pump is necessary
- Has an excellent safety record

FUEL SYSTEM OVERVIEW

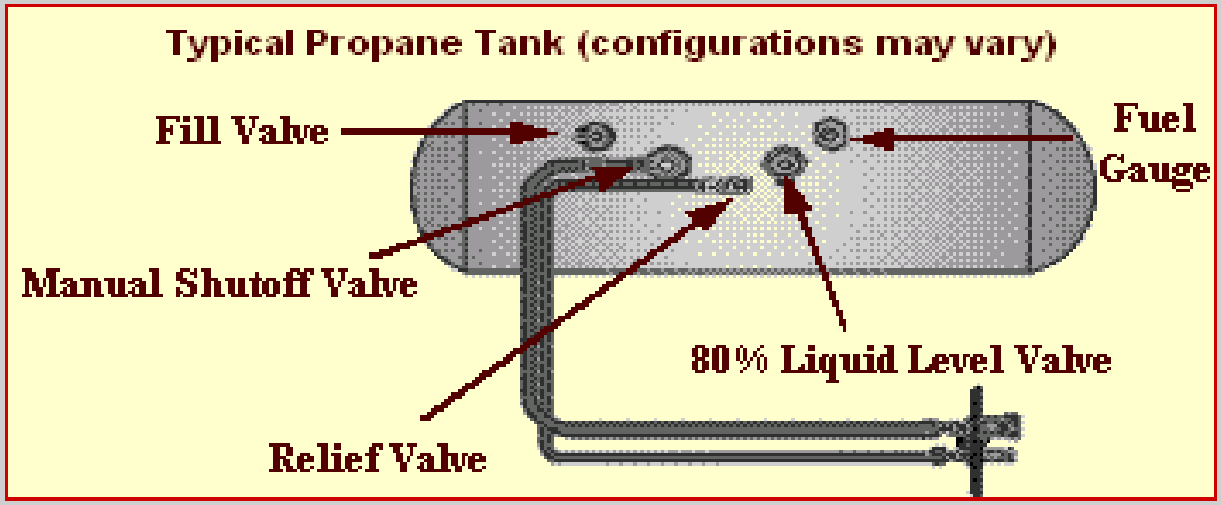
Propane vehicle fuel systems have five major components:



1. Tank
2. Fuel Lines & Fittings
3. Fuel Lock
4. Converter-Regulator
5. Air-Fuel Mixer

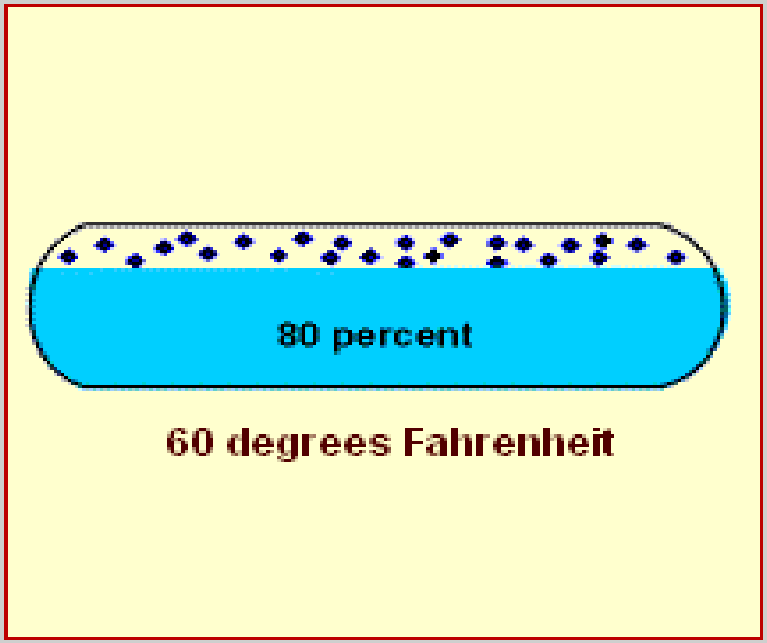
PROPANE TANKS

Propane fuel tanks are constructed of heavy gauge steel or aluminum to withstand the vapor pressures that result from changes in ambient temperature. Tanks must be certified in accordance with ASME or DOT standards. Externally mounted tanks must be rated at 250 psi, truck mounted tanks at 312.5 psi, and fork lift tanks at 375 psi.



80% FILL CAPACITY

Propane tanks are filled to 80 percent capacity to allow for thermal expansion. Changes in temperature cause LPG to expand and the pressure to increase.



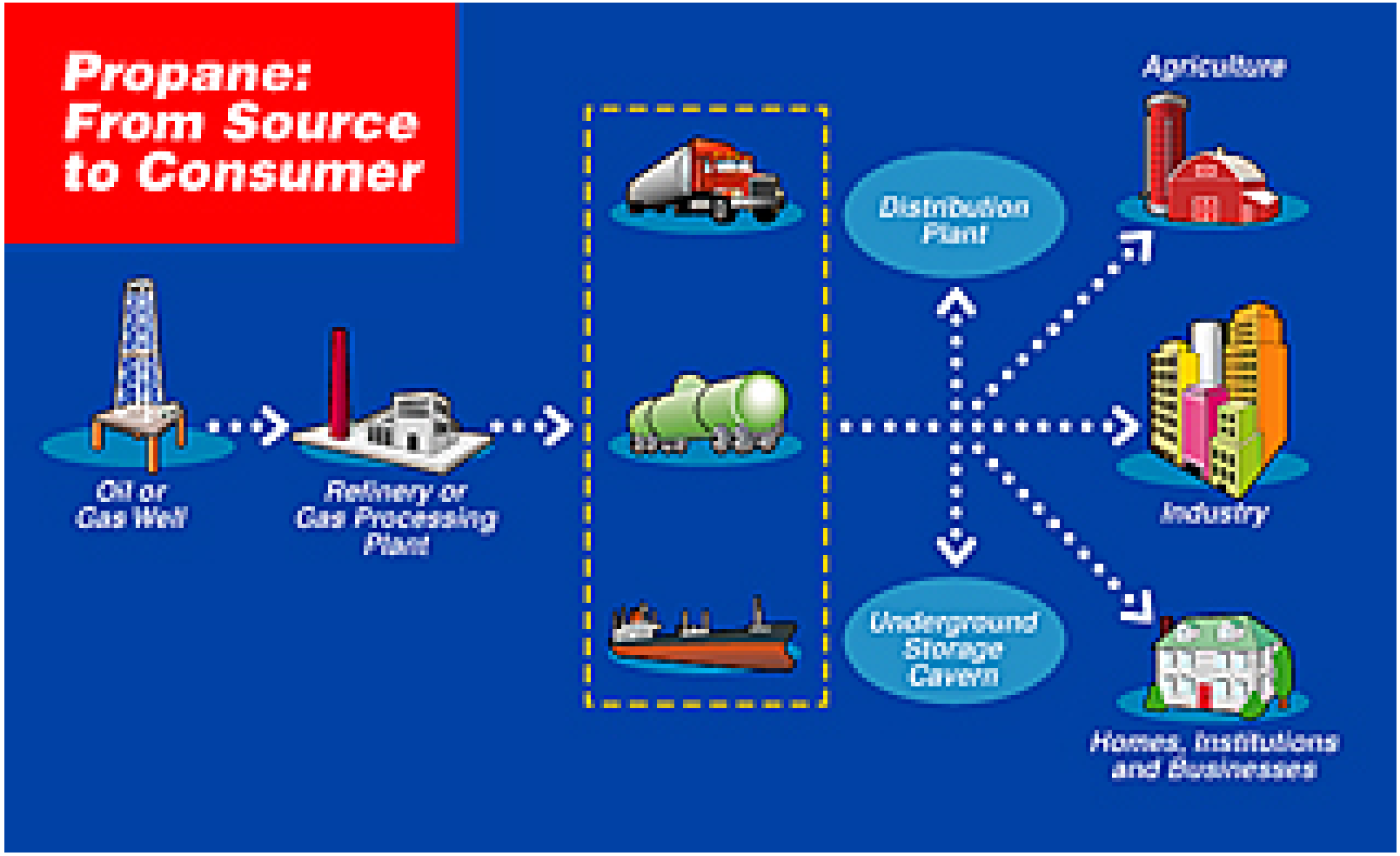
AVAILABILITY OF LPG AND INFRASTRUCTURE

- US is the world's largest producer of LPG
- LPG quantities available to supply 21 million vehicles or (12.5% of U.S. automobiles)

INFRASTRUCTURE

- Transported from Refinery by Pipeline, Railroad and Tanker
- Stored at Distribution Centers strategically located throughout the United States
- Distributed by Bobtail Truck to the end user
- Vehicle Refueling at Fleet location or public station

REACH THE CONSUMER?



TRANSPORTATION FOR DISTRIBUTION

LPG Rail Car

TRANSPORTATION FOR DISTRIBUTION

LPG Transport

TRANSPORT STORAGE CONTAINER

18,000 Gallon Portable Container

STORAGE FOR DISTRIBUTION

30,000 gallon tank

LOCAL DISTRIBUTION

Bobtail Delivery Truck

VEHICLE REFUELING STATION

FLEET REFUELING STATION

PUBLIC REFUELING STATION

PROPANE DISPENSER

PROPANE DISPENSER

REFUELING STATION LOCATOR

- www.propanegas .com - location of nearest refueling facility and driving directions
- www.afdc.doe.gov - location of refueling facility by state with directions

PROPANE POWERED VEHICLES

- Vehicle manufactures are offering more factory produced propane vehicles than ever before!
- Conversion of gasoline vehicles can be accomplished at a reasonable cost and offer flexibility for the user

BI-FUEL PROPANE VEHICLES

- Operates on propane or gasoline
- Range extended substantially
- Versatile

BI-FUEL

Ford F-Series Super Duty Chassis

FORD BI-FUEL F-SERIES

DEDICATED PROPANE VEHICELS

- Optimized for operation on propane
- Lowest emission levels
- May qualify for state and local incentives

DEDICATED PROPANE VEHICELS

C-Series HD Chassis

DEDICATED PROPANE VEHICLES

Chevrolet Silverado Pickup

PROPANE – SUMMARY

- Propane is an excellent choice as an alternative fuel because the fuel is:
  - Readily available
  - The most widely used alternative fuel
  - Safe
  - Nice for cooking Steaks!

THANK YOU !!!

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